REMARKS

Upon entry of the present amendment, claims 1-3, 6, 10, 14 and 16-20 remain in the application, of which claims 1, 6, and 17 are independent. Claims 1, 6 and 18 have been amended by the present amendment. Claims 4, 5, 7-9, 11-13 and 15 have been cancelled without prejudice and without dedication or abandonment of the subject matter thereof.

The above-identified Office Action has been reviewed, the references carefully considered, and the Examiner's comments carefully weighed. In view thereof, the present Amendment-C is submitted.

It is contended that by the present amendment, all bases of rejection set forth in the Office Action have been traversed and overcome. Accordingly, reconsideration and withdrawal of the rejection is respectfully requested.

Claim Rejections – 35 USC § 103

1. At item 3 of the Office Action, the Examiner rejected claims 1-4, 6-8, 10 and 13 under 35 USC §103(a) as being unpatentable over JP 2002-060845.

2. At item 4 of the Office Action, the Examiner rejected claims 5, 9, 11, 12, 15 and 17-19 under 35 USC §103(a) as being unpatentable over JP 2002-060845 as applied to claim 1 above, and further in view of JP 10-204,610.

3. At item 5 of the Office Action, the Examiner rejected claim 14 under 35 USC §103(a) as being unpatentable over JP 2002-060845 as applied to claim 1 above, and further in view of US 6,546,968 to Nakagawa et al.

4. At item 6 of the Office Action, the Examiner rejected claims 16 and 20 under 35 USC §103(a) as being unpatentable over JP 2002-060845 in view of JP 10-204,610b as applied to claim 5 above, and further in view of US 6,546,968 to Nakagawa et al.

Applicant's Response:

As stated above, applicant has amended claims 1, 6 and 18 by the present amendment. Upon careful consideration and in light of the above amendments, applicant traverses the Examiner's rejection of claims, submits that the rejection is overcome, and respectfully requests reconsideration and withdrawal of such rejection.

Applicant respectfully submits that JP10-204610 (hereinafter referred to as JP'610) discloses not a casting die but a forging die, thus thermal insulation properties are required therein.

In contrast, the present invention relates to a casting die for receiving cooling and solidifying a molten metal, and does not require thermal insulation properties. Thus, even if JP'610 would disclose effects of sulphonitriding treatment on thermal insulation properties, an application of sulphonitriding to a casting die, which does not require thermal insulation properties, is never suggested in the JP'610 disclosure.

Further, the disclosure of JP2002-60845 (hereinafter referred to as JP'845), which relates to a casting die does not disclose lubrication at all. Thus, applicant respectfully submits that for a person of ordinary skill in the art it is not obvious to apply a lubrication agent to a casting die in line with lubrication by sulphonitriding as disclosed in JP'610 relating to a forging die.

According to the claimed invention, as recited in amended claim 6, a first shot peening treatment is carried out, a sulphonitriding treatment is carried out after the shot peening treatment, and a second shot peening treatment is carried out after the sulphonitriding treatment, to allow the nitrided layer to contain iron sulfide (as also recited in amended claim 1). A surface treatment method comprising such processes, i.e., the combination of the shot peening treatment and sulphonitriding treatment is disclosed neither in JP'610 nor in JP'845. The combination of

these references also fails to provide such claimed features.

Further, according to the present invention, a sulphonitriding treatment is carried out, as specified in lines 6 to 16 of page 7 and in lines19 to 25 of page 8 in the present specification, a nitrided layer can contain iron sulfide. Thus, advantageous effects can be obtained, in which the compressive residual stress remaining in a casting die is further raised and the durability of the casting die is significantly improved.

Additionally, in the present invention, the maximum height of the cavity surface is not more than 8 μm, and the cavity surface is highly smoothed. Accordingly, as disclosed in lines 4 to 11 of page 8 in the present specification, both a nitrogen atom and a sulfur atom are easily bonded to Fe to form a nitrided layer containing iron sulfide.

In other words, the present invention is advantageous to diffuse and penetrate a nitrogen atom and a sulfur atom inside a steel material with ease. As a result, the nitrided layer of the cavity surface of the casting die can be made lubricant by containing iron sulfide. When a cast product is taken out, frictional resistance between the cast product and the casting die is decreased. Accordingly, chipping of the casting die can be avoided. Therefore, the claimed invention is not obvious from the disclosures of JP'845 and/or JP'610 on this point as well.

Further, applicant notes that Nakagawa et al. disclose a bond magnet and a method of manufacturing a bond magnet. The disclosure of Nakagawa et al. is related to a high performance rare-earth magnet for use in motors, and the method of forming the magnet (press/compression molding a mixture of magnetic powder and resin-based binder under controlled conditions) so as to have a desired density. Applicant respectfully submits that the Nakagawa et al. is an unrelated (non analogous) art reference, whereby it would not be obvious to apply the teachings of Nakagawa to a surface treatment of a steel die as disclosed in JP'845.

Therefore, applicant respectfully disagrees that teachings related to heat treatment of flakes of magnetic material are transferable to heat treatment of a steel die of the claimed invention.

Based of the foregoing, applicant respectfully submits that, the claimed invention includes features which are neither disclosed nor suggested in any of the applied references JP'845, JP'610 and Nakagawa et al., considered either singly or in combination. Further, with these features, an excellent effect which cannot be expected from JP'845 and/or JP'610 can be obtained. Therefore, the present invention is not obvious over the disclosures of JP'610, JP'845 and Nakagawa et al., considered either singly or in combination.

For all of the foregoing reasons, applicant requests reconsideration and withdrawal of the rejection of claims 1-3, 6, 10, 14 and 16-20 under 35 USC §103(a).

Other Matters

As stated above, in the interest expediting the prosecution of the application and to place the application in condition for allowance, applicant has amended claims 1, 6 and 18 by the present amendment. Claims 4, 5, 7-9, 11-13 and 15 have been cancelled.

Claim 1 has been amended to incorporate features of claims 4 and 15 (now cancelled), to specify that a compressive residual stress of a cavity surface is larger than 1200 MPa, and a maximum height of roughness of the cavity surface is not more than 8 μm, wherein the nitrided layer is a compound diffusion layer containing both iron sulfide and iron nitride.

Claim 6 has been amended to incorporate features of claims 7-9 (now cancelled), to specify that a surface treatment method of a casting die made of a steel material, comprising applying a first shot peening treatment, applying a sulphonitriding treatment after applying the shot peening treatment, and applying a second shot peening treatment after applying the

sulphonitriding treatment to at least a cavity surface of said casting die so that a maximum height of roughness of said cavity surface is not more than 8 μm, and a compressive residual stress is larger than 1200 MPa.

Claim 18 has been amended to correct an editorial error.

Applicant respectfully submits that all of the above amendments are fully supported by the original disclosure including the drawings. The applicant also respectfully submits that no new matter have been added into the application by the present amendments to the claims and specification, since all of the subject matter thereof was expressly or inherently disclosed in the original specification and drawings.

Conclusion

Based on all of the foregoing, applicant respectfully submits that all of the objections and rejections set forth in the Office Action are overcome, and that as presently amended, all of the pending claims are believed to be allowable over all of the references of record, whether considered singly or in any reasonable combination.

It is applicant's contention that no possible reading of the references, either singly or in any reasonable combination, can be viewed as teaching applicant's claimed invention.

For all of the above mentioned reasons, applicant requests reconsideration and withdrawal of the rejection of record, and allowance of each of the pending claims.

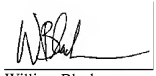
Entry of the present Amendment-C is respectfully requested under 37 CFR 1.116 on the grounds that: the amendment does not raise any new issues for consideration by the Examiner, but instead merely present amendments to claims which are believed to place the claims in

condition for allowance for the reasons discussed hereinabove, and therefore, the present amendment is believed to place the application in condition for allowance.

If any issues remain unresolved, applicant respectfully requests that the Examiner telephonically contact applicant's undersigned representative to expedite prosecution of the application.

Favorable consideration is respectfully requested.

Respectfully submitted,



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